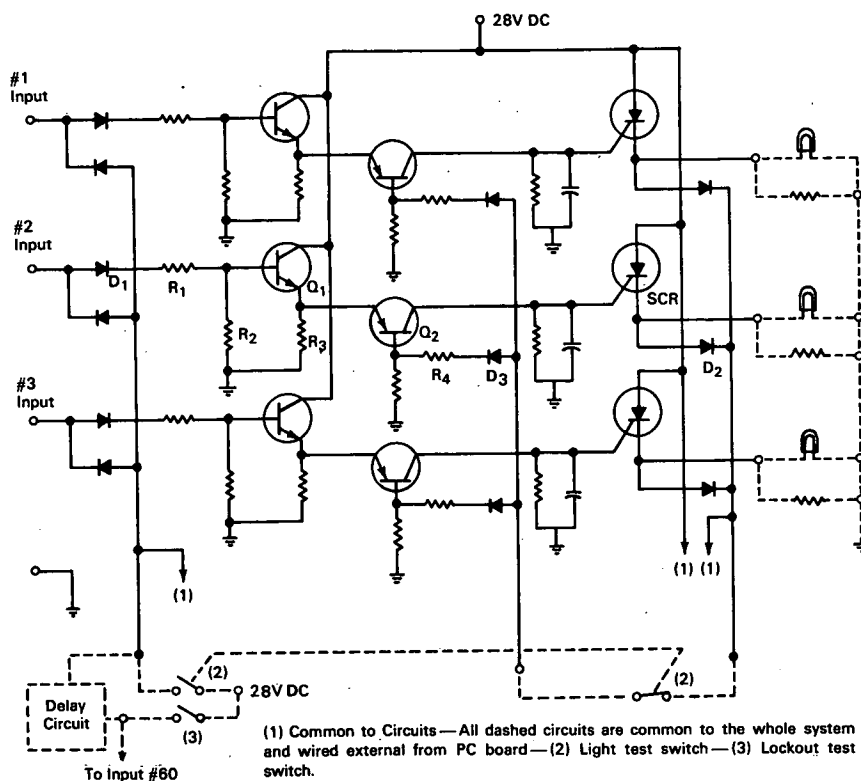


NASA TECH BRIEF



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Solid State Annunciator Facilitates Complex System Troubleshooting



The problem:

In the testing of complex systems, an indication of the first incoming cut signal terminating a test is required in order to troubleshoot the cause of termination. Presently used equipment is too slow and does not monitor sufficient parameters to indicate the initial cause of a test shutdown.

The solution:

A solid state annunciator that monitors up to 60 parameters for a dc voltage change from zero to 28 volts.

How it's done:

Three typical channels and associated circuitry are shown although discussion is limited to the operation of one because all are identical. Assuming all inputs at zero potential and the unit reset, a 28 vdc signal is applied to the number 2 input. Diode D₁ passes the signal to the voltage divider R₁, R₂, thus applying a positive potential to the base of Q₁, causing it to conduct. Q₁ establishes a threshold against noise, which could otherwise cause false response. The output from Q₁ is developed across R₃ and applied to the emitter of Q₂, which will conduct as long as its

(continued overleaf)

base is not biased for cutoff. From the collector of Q₂ the signal is applied to the gate of the SCR causing it to conduct. The 28 vdc at the cathode of the SCR performs 2 functions: it lights the lamp to indicate the channel associated with the first malfunctioning test component; it also applies the 28 vdc to a bus, through D₂, that feeds back to the bases of all Q₂ transistors through all D₃ diodes and R₄ resistors to lock out all other SCR rectifiers.

A light test circuit (2) checks for proper operation of all channels by interrupting the feedback from the SCR cathodes to the Q₂ bases and simultaneously applying a 28 vdc signal to all inputs. A lockout test circuit (3) applies a 28 vdc signal to only 1 input and after a 10-20 microsecond delay, to all other inputs. If the system is functioning properly, only the lamp associated with the first input energized will light.

Notes:

1. This annunciator is presently being used for testing of the complex J-2 rocket engine.
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10505

Patent status:

No patent action is contemplated by NASA.

Source: H. P. Hofer
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